

The Mediating Effect of MIS on Warehousing HCM and Efficiency in Small and Medium Enterprises (SMEs)

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ABSTRACT

Challenges on issues and problems of warehouse efficiencies are always the major concern in the business globalization process. As part of the major logistics and supply chain management activities, warehousing is always part of the strategic and competency plan for companies in enhancing their positions in the logistics industries as their services providers. The objectives of this paper is to examine whether there is any mediating effect of warehousing Management Information System (MIS) in the relationship between warehousing Human Capital Management (HCM) and warehouse efficiency. Overall 182 Small and medium Enterprises (SMEs) were involved in this study with the findings showed that there is a strong relationship between the warehousing operations and warehouse efficiency. The findings indicate the important of warehouse efficiency in the manufacturing firms. Theoretically, the research contributes to the growth and development of the warehouse efficiency theories. Practically it would contribute the owners or warehouse managers of the manufacturing firms in making the right management decisions regarding the warehousing. Therefore, this study provides new knowledge and important insights of warehousing attributes that will benefit manufacturing firms and other related industries, particularly for SMEs in Malaysia.

Keywords: Warehouse Efficiency, Human Capital Management (HCM), Management Information System (MIS) and Small and Medium Enterprises (SMEs)

I INTRODUCTION

Issues on warehouse efficiency are not comprehensively studied until the business globalization process takes place (Rosen, Harlina & Sabariah 2008; Jusoh & Khamis, 2009; Ismail, Hashim, Ghani, Zulkifli, Kamilah & Rahman, 2009). The problems keep on developing and continuing with the evolution of the logistics roles which took place actively during that time (Gundlach, Bolumole, Eltanway & Frankel, 2006). This especially happened actively in the last two decades in the Supply Chain

Networks in which warehouse is part of the logistics major service providers (Sink, Langley & Gibson, 1996; Koster, Le Duc & Roodbergen, 2007; Lambert, Stock & Ellram, 1998). Tomkins and Smith (1998) described that warehouse efficiency has now become a core competency, a strategic weapon that many companies is using to enhance their positions. At the same time, the warehouse efficiency is undergoing unbelievable challenges that make excellence harder to achieve. Warehousing before this has been viewed as a supportive industry to other functional areas but it is regarded as a strategic industry on its own (Gundlach *et al.*, 2006; Sum, Teo & Ng, 2001). With the current circumstance of global competitiveness and supply chain concepts, it has greatly changed the direction of warehouse efficiency perspective as the research proved to be as that (Harmon, 1993). Hamel and Prahalad (1994) regarded this development when the business activities become more complex, competition for the future are considerably an opportunity sharing rather than market sharing. Due to the enormous challenges being faced by the warehouses efficiency, it requires much more professional approaches than the previously adopted approaches in planning, managing and improving in today's warehouse operations (Tomkins and Smith (1998).

Malaysian companies would continually increase their capabilities in the logistics services in the near future through the implementation of activities such as warehousing management, inventory replenishment and order fulfillments (Sohail & Sohail, 2003). In today's competitive business environment which many companies are strategizing to gain and share the global markets, the companies are actively taking advantage of higher production and sourcing efficiency. Keys to that success are determined by the role of the logistics functions (which warehouse is one of the major service providers) in ensuring the smooth flow of materials, products and information throughout a company's supply chains (Sum *et al.*, 2001). This has greatly contributed to the changes of warehouses business

perspective which required warehousing to be more efficient in their operations, HCM, layout and MIS. Due to the increasing importance of the logistics industry and warehouse efficiency, it has resulted to the expansion of the international trade as well as an active endorsement of the company's and business globalization strategy (Rosena *et al.*, 2008). Saleh and Ndubisi (2006a) analyzed that SMEs have accounted for more than 80 percent of the total manufacturing establishments in Malaysia. With favorable environmental factors, the SMEs in Malaysia are expected to transcend from their present status to undertake a more important role in order to support the requirements of Malaysia's industrialization process. However, Jusoh and Khamis (2009) cautioned that in order to survive, the SMEs must be able to reduce costs, improve quality and provide a rapid efficient response to the customer's needs. One of the ways of achieving that competitive edge is through the implementations of the best logistics (and warehousing) practices (Jusoh and Khamis, 2009).

Issues and challenges affecting warehouse efficiency processes are becoming seriously focused in managing the logistics industries, in which warehousing is part of the major logistics activities in the service providers. Other major activities related are transportation, inventory management, order processing, information system and packaging. Instead, warehousing has been a neglected area of business activity in Malaysia (Rosena *et al.*, 2008). It becomes worst as the business environments are becoming more challenging, wider and global markets have contributed to produce a large scale of products by any organizations. This creates the increase of inventories in order to meet these demands for company operations and customer satisfactions (Ismail *et al.*, 2009). In this research write-up, the researcher focuses on warehousing HCM, warehouse efficiency and MIS mediation in Malaysia SMEs manufacturing.

II OBJECTIVES

To examine the mediating effect of warehousing MIS in the relationship between warehousing Human Capital Management (HCM) and warehouse efficiency in Malaysia SMEs manufacturing.

III LITERATURE REVIEW

SMEs in manufacturing sector were involved in activities such as the processing of raw materials, including food, beverages, textiles, petroleum, wood, rubber and the assembly and manufacturing of

electrical and electronics appliances and components (Saleh & Ndubisi, 2006b). The SMEs Census 2011 (2012a & 2012b) reported that a total of 645,136 SMEs of all sectors are operating their businesses in Malaysia (as according to respective states) with 5.9 percent in Manufacturing Sector, 90 percent in Services Sector and the remaining 1.0 percent in Agriculture Sector and 0.1 percent in Mining and Quarrying Sector. It also stated that the SMEs contribution to GDP has increased from 29.4 percent (2005) to 32.5 percent (2011). SME Corp (2012) reported that based on a 5.9 percent or 37,861 manufacturing SMEs in the Manufacturing Sector, the largest concentrations are in the textiles and wearing apparel sector (10,047 SMEs or 26.54 percent), followed by food and beverages products (6,016 SMEs or 15.89 percent), fabricated metal products (3,958 SMEs or 10.45 percent), and printing and reproduction of recorded media (2,918 SMEs or 7.71 percent).

In practice warehouse is defined as a planned space for the storage and handling of goods and materials (Emmett, 2005), with large building and it plays an important part in the organization related to its business purpose (Tompkins & Smith, 1998; Frazelle, 2002). Lambert *et al.* (1998) described that warehouse activities have more focus on the core competencies of the operational which could satisfy customers' expectation on the shorter delivery of time and more accurate services. Stock and Lambert (2001) added that there are six types of public warehouses encompassing general merchandise for manufactured goods, refrigerated or cold storage, bounded, household goods and furniture, special commodity and bulk storage.

Rouwenhorst, Reuter, Stockrahm, Van Houtum, Mantel and Zijm (2000) mentioned that the efficiency and effectiveness in any distribution network in turn is largely determined by the operations of the nodes and the warehouses. Koster and Warffemius (2005) argued that complexity of a warehouse operation has a large impact on the performance of the warehouse, and in this case on the efficiency of the warehouse. Gunasekaran, Marri and Menci (1999) mentioned warehousing comprises six major operation throughput activities which are receiving, transfer, handling, storage, packing and expediting. Conclusion, timely and accurate information about products, resources and processes are essential to operate a planning and control structure to achieve high performance of warehousing operation in today's highly competitive marketplace (Faber, Koster & Van de Velde, 2002). Murphy and Poist

(1993) argued that warehouse as the most costly activities in logistics because a major part of its operations is labor intensive thus to improve operational and organizational performance. Ellinger, Ellinger and Keller (2005) believed that firms wishing to remain in competition effectively in the logistics (and warehousing) industry would increasingly evaluate the feasibility of adopting more people oriented to focus on the growth and development. This might produce more groups of front line logistics and warehousing employees.

Autry, Griffis, Goldsby and Bobbitt (2005) specified that the need for data management to support logistics processes has created market oriented demands for specialized information systems and custom-designed for logistics management needs. As results, many firms begun to invest in technologies that enhance decision make capabilities for transport management, warehouse management, demand forecasting and planning among others (Bowersox, Closs, and Stank, 1999). In warehousing, information on inbound and outbound flows, weight and volume of stored products by type and cost of inventory are necessary (Pokharel, 2005). Modern warehousing concerns speed and efficiency related to automation, computerization and new means of communications (Jenkins, 1990). Warehouse efficiency and effectiveness could be measured by safety, shipping errors, on-time shipments, customer problems, cost per line shipped and total warehouse expenses (Lambert *et al.*, 1998). In enhancing efficiencies, warehouse quality performance is used to determine warehouse efficiency which are put away, inventory, picking and shipping accuracy (Frazelle, 2002).

Human Capital Management or HCM denotes an organisation's employees, described in terms of training, experience, judgment, intelligence, relationships, and insights of company's employees (Noe, Hollenbeck, Gerhart, & Wright, 2009). According to Offstein, Gynyawali, and Cobb (2005), HCM is the full range of knowledge, skills, and abilities an individual could use to produce a given set of outcomes. Components of general human capital are knowledge of one's competitors, suppliers, customers, and other significant external stakeholders. Offstein *et al.* (2005) referred to these combinations of firm-specific and general forms of human capital as to provide unique advantages to the firm as it relates to the launching of specific and observable competitive moves within the marketplace. Bartlett and Ghoshal (1995), and Hout and Carter (1995) commented that firms related to manufacturing industries (with warehousing as a

major operational function) are the most affected in engaging warehousing HCM to be developed significantly. Ellinger, Ellinger, and Keller (2005) believed that firms wishing to remain competitive effectively in the logistics industry could increasingly evaluate the feasibility of adopting more people-oriented supervisory approaches in warehousing HCM. As an instance, coaching that focuses on the company's growth and development by producing more groups or teams of front-line logistics and warehouse employees is implemented continuously in producing quality operation workers. Baron and Armstrong (2007) explained that human capital represents the human factors in the organisation or a firm. These include the collective efforts regarding with intelligence, skills, and expertise that give the organisation its distinctive character. It is the people that bring human capital to the organisation although it is then developed by experience and training. In addition, Becker (1993) mentioned that the most precious capital is investment in human capital by providing education and appropriate training that is useful in their daily operations or works. Therefore, warehouse management must always be sensitive and conscious about the current requirements of their staff and worker's working competency (Min, 2007). Noe *et al.* (2009) added that employees are able to learn job-related knowledge, skills, and behaviour from the firms' planned effort. Through sufficient training programmes, warehousing HCM is positively related with the logistics and warehousing activities elsewhere. As described by Marimuthu, Arokiasamy, and Ismail (2009), human capital is getting wider attention with increasing globalisation and also the situation of the job market due to the downturn in the various economies of the world.

IV THEORETICAL FRAMEWORK

This study recognizes that the warehouse management related to its HCM and MIS play crucial roles in achieving the desired warehouse efficiency and performance.

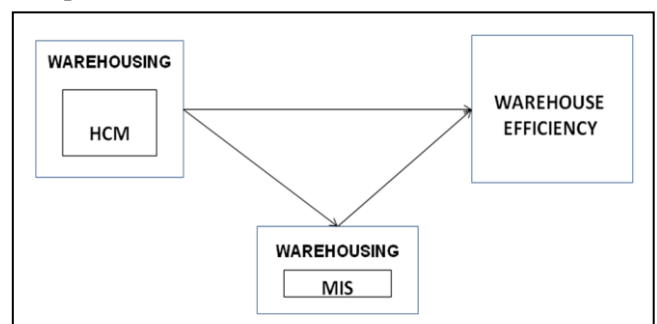


Figure 1: Theoretical Research Framework

V HYPOTHESES

There is a mediating effect of warehousing MIS in the relationship between warehousing HCM and warehouse efficiency.

VI METHODOLOGY

The target population for this study is SMEs manufacturing firms in Malaysia which are listed under the SME Business Directory (2013). According to SMEs Corp (2012), a total of 37,861 SMEs establishment in Malaysia are listed under the Manufacturing Sector, specifically are in textiles and wearing apparel; food & beverages products; fabricated metal products; printing and reproduction of recorded media; machinery and equipment; furniture; rubber and plastics products; wood & wood products; non-metallic mineral products; basic metal; electronics and electrical products; paper and paper products; motor vehicles, trailers and semi-trailers and other transport equipment; leather and related products; basic pharmaceutical products and pharmaceutical preparations; coke and refined petroleum products; tobacco products; and others. Only owners of the SMEs are given the questionnaire surveys for them to response. Research questionnaires are designed on the basis on the framework variables that are the warehouse efficiency, operation and MIS with a total of 42 questions using the Likert Scale between 1 = 'strongly disagree' and 5 = 'strongly agree'.

In this research, through postal services, as required by Krejcie and Morgan (1970), 1,000 questionnaires were sent to SMEs manufacturing owners throughout Peninsular Malaysia. However, out of 1,000 questionnaires posted to the population, only 220 responded and only 182 are found to be useful for the studies, from which the overall response rate is 18.9 percent or 19 percent (round-up). This is deemed acceptable response rate for top management questionnaires in social science research (Menon, Sundar & Roy, 1996; Baruch, 1999). Data are analyzed using the SPSS Version 19 program. Non-respondent characteristics are studied in order to check as the lack of response is significant.

The collected data are summarized, analyzed, interpreted and presented to address the research objectives that prompted the entire research process. Test on the mediating role of warehouse efficiency was based on a multiple linear regressions, as suggested by Baron and Kenny (1986) and Sobel Test

was conducted accordingly. It is necessary to gauge the extent of reliability of the instruments used in the study. Thus the necessary test is carried out. Ideally the Cronbach α coefficient of a scale should be at least 0.7 (Hair, Anderson & Tatham, 1995). The pre-testing exercise was done with 50 SMEs manufacturing firms listed in the SME Business Directory (2013) but only 36 of the pre-tested sampling were returned with only 30 found useful. According to Roscoe (1975), a sample size of more than 30 but less than 500 was appropriate for most researches.

Table 1 gives the alpha coefficient of reliability in the pre-test and post-test analysis of the research instrument. Based on the pre-testing exercise, all the items for each construct post a Cronbach α value of as low as 0.70 as high as 0.99. This means the rules tests in the pre-test and post-test modes indicate that the instruments are highly reliable.

Table 1: Cronbach α Coefficient of Reliability (Pre-Test and Post-Test Analysis)

Constructs	No. of Items Pre-test	No. of Items Post-test	Reliability Index Pre-test (n: 30)	Reliability Index Post-test (n: 182)
Warehouse Efficiency	21	18	0.814	0.945
Warehouse HCM	5	5	0.713	0.794
Warehouse MIS	12	10	0.835	0.859

Nunnally (1978) defined validity as the degree to which measurement scale measures what it is intended to measure. Peter (1981) identified that validity refers to the extent to which a measurement tool actually measures the construct that is used to measure. In this study, the Bartlett test of sphericity and the Kaiser Meyer Olin (KMO) measure of sampling adequacy (SMA) or > 100 are applied to investigate the validity of the constructs. The statistical scores of this test for all constructs are shown in Table 2. Therefore all the questions used in the questionnaires are mostly valid as the results are 0.50 and above is sufficiently large to permit factor analysis to represent the validity constructs (Hair, Black, Babin, Anderson & Tatham, 2006).

Table 2: Investigating Validity: Results of KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity.

Constructs	Kaiser Meyer-Olin Measure (KMO) of Sampling Adequacy	Bartlett Test of Sphericity
Warehouse Efficiency	0.887	3950.906
Warehousing HCM	0.793	652.894
Warehousing MIS	0.790	1223.955

VII FINDINGS

A correlation analysis is applied in evaluating the strength and direction of the linear relationships between two variables (Pallant, 2007). Based on this study, summary analyses of the overall Pearson Correlations (as referred to Table 3) are conducted. The best value or perfect correlation is $-1 \leq \rho \leq 1$. For the correlation coefficient, anything that is below 0.05 or ≤ 0.05 is considered significant or positive and anything that is above than that is considered not significant or negative. The study found that the Warehouse Efficiency (AWE) is significance with the Warehousing Human Capital Management (AHCM) variables above 0.7 while Warehousing MIS (AMIS) above 0.5.

Table 3: Pearson Correlation Results

		AWE	AHCM	AMIS
AWE	Pearson Correlation	1		
	Sig.			
	N	182		
AHCM	Pearson Correlation	.744(**)	1	
	Sig.	.000		
	N	182	182	
AMIS	Pearson Correlation	.518(**)	.405(**)	1
	Sig.	.000	.000	
	N	182	182	182

Upon the completion of correlation analysis and multiple regressions analysis using the SPSS Version 19 are performed to obtain the fact of any influence between the independent variables (Warehousing HCM), mediating variable (Warehousing MIS) and the dependent variable (Warehouse Efficiency). The steps taken in analyzing the relationships of the variables are based on the recommendations of Baron and Kenny (1986). The obtained results of the analysis are explained in the applications of multiple linear regressions formula ($Y = B_0 + B_1 X_1 + \dots + B_p X_p + \epsilon$) (refer to Table 4 and Table 5).

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.871(a)	.758	.753	.15465	.758	138.847	4	177	.000

a Predictors: (Constant), AMIS, AHCM,

b Dependent Variable: AWE

Table 5: Correlations Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.420	.157		2.677	.008
	AHCM	.387	.045	.398	8.569	.000
	AMIS	.122	.041	.161	2.999	.003

a Dependent Variable: AWE

It is found that, $AWE = 0.420 + 0.387AHCM + 0.122AMIS$. All the coefficients are significance with $R^2 = 0.758$. Therefore there are 75.8 percent of total variations in AWE explained by AHCM and AMIS in maintaining the warehouse efficiency. Therefore, in conclusion, for variables AHCM and AMIS, the relationships are significant with the $R^2 = 0.758$ or 75.8 percent to explained in model AWE. In this test, it is found that there are significance value of variables AHCM (0.00) and AMIS (0.00). This reflects of the significant role of AHCM and AMIS in maintaining the warehouse efficiency.

A. Hypothesis: There is a mediating effect of Warehousing MIS (AMIS) in the relationship between Warehousing HCM (AWH) and Warehouse Efficiency (AWE).

Table 6 demonstrates that Step 1 results for the unstandardized regression coefficient ($B=0.723$) indicate the Warehousing HCM affects the Warehouse Efficiency significantly ($p<0.01$). Step 2 results of the unstandardized regression coefficient ($B=0.518$) indicate the Warehousing HCM affects the Warehousing MIS significantly ($p<0.01$). Thus the requirement for mediation analysis in Step 2 as suggested by Baron and Kenny (1986) is accomplished. Step 3 results of the unstandardized regression coefficient associated with the relation between the Warehousing MIS and Warehouse

Efficiency are significant (0.621, $p < 0.01$). This regression equation also provides an estimate of the relation between the Warehousing HCM and the Warehouse Efficiency, controlling for the Warehousing MIS ($B = 0.198$).

Table 6: Measuring the degree of influence of AMIS in the relationship between AHCM and AWE

	F	R ²	B	SE B	Beta	T	Sig
Step 1							
Outcome: Warehouse Efficiency	222.514						
Predictor: Warehousing HCM		0.553	0.723	0.048	0.744	14.917	0.00
Step 2							
Outcome: Warehousing MIS	35.284						
Predictor: Warehousing HCM		0.164	0.518	0.087	0.405	5.940	0.00
Step 3							
Outcome: Warehouse Efficiency	139.591						
Predictor: Warehousing HCM		0.553	0.621	0.050	0.638	12.492	0.00
Mediator: Warehousing MIS		0.609	0.198	0.039	0.260	5.088	0.00

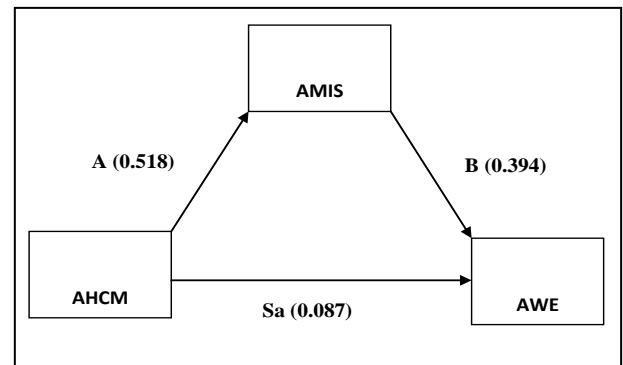
Table 7 shows that the Step 4 of the Sobel, Aroian and Goodman tests, using the Preacher and Leonardilli webpage (Preacher & Leonardilli, 2012) indicates the results are significant, $p < 0.05$.

Table 7: Using Sobel test as to measure the mediating effect of AMIS in the relationship between AHCM and AWE

	Input		Test statistics	p-value significance
A: Warehousing HCM	0.518	Sobel test:	4.819	0.00
B: Warehousing MIS	0.394	Aroian test:	4.79	0.00
Sa: Warehousing HCM	0.087	Goodman test:	4.843	0.00
Sb: Warehousing MIS	0.048			

Figure 2 indicates the relationship of tested variables (AHCM, AMIS and AWE) after mediation that Warehousing MIS mediates the relationship between the Warehousing HCM (0.518) and Warehouse Efficiency (0.394) with 0.085 between Warehousing HCM and Warehouse Efficiency. Therefore, the study found that there is a mediating effect by Warehousing MIS in the relationship between Warehousing HCM and Warehousing Efficiency.

Figure 2. Relationship of tested variables (AHCM, AMIS and AWE) after mediation



VIII CONCLUSIONS

The results indicate the importance of warehouse efficiency in the manufacturing firms. The warehouse HCM and MIS are the main basic variables for process management improvement in making the warehouse to be efficient and firm performance achievable. It is through the Warehousing MIS mediation to the Warehousing HCM that mediates positively to its relationship over the Warehouse Efficiency. Thus the manufacturing firm achievement is realistically depending on the warehouse performance in ensuring mainly good results of inventory accuracy and space optimization that reflects the firm operational process performance. Hopefully the research would open the horizon clearly to the top management of the manufacturing firm of the importance of warehousing management and its process operations. As the globalize business is getting more competitive and volatile, the functions of warehouse is realistically could not be denied of its pivotal role. The remarks in practice that warehouse is liked a 'bank' and 'heart of the factory' speak the volume of its contributions to the manufacturing firms or any organizations (Adam, 2012).

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